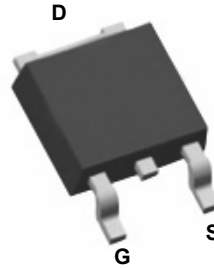
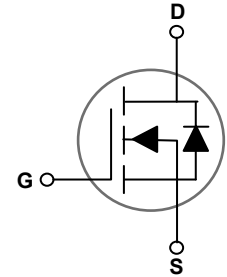


## Main Product Characteristics

$BV_{DSS}$	65V
$R_{DS(ON)}$	8.8m $\Omega$
$I_D$	50A



TO-252 (DPAK)



Schematic Diagram

## Features and Benefits

- Advanced MOSFET process technology
- Ideal for high efficiency switched mode power supplies
- Low on-resistance with low gate charge
- Fast switching and reverse body recovery

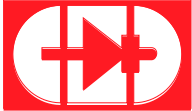


## Description

The GSFD0650 utilizes the latest techniques to achieve high cell density and low on-resistance. These features make this device extremely efficient and reliable for use in high efficiency switch mode power supplies and a wide variety of other applications.

## Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	$V_{DS}$	65	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous ( $T_C=25^\circ\text{C}$ )	$I_D$	50	A
Drain Current-Continuous ( $T_C=100^\circ\text{C}$ )		31.6	
Drain Current-Pulsed <sup>1</sup>	$I_{DM}$	200	A
Single Pulse Avalanche Energy <sup>2</sup>	$E_{AS}$	68.5	mJ
Single Pulse Avalanche Current <sup>2</sup>	$I_{AS}$	37	A
Power Dissipation ( $T_C=25^\circ\text{C}$ )	$P_D$	53	W
Power Dissipation-Derate above $25^\circ\text{C}$		0.42	
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	62	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	2.36	$^\circ\text{C}/\text{W}$
Operating Junction Temperature Range	$T_J$	-55 To +150	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	-55 To +150	$^\circ\text{C}$

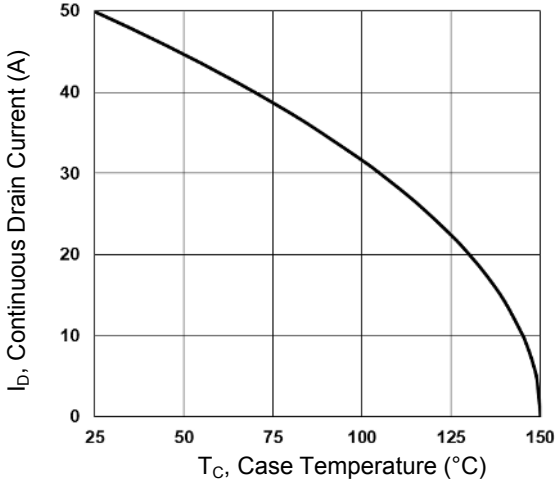

**Electrical Characteristics** ( $T_J=25^\circ\text{C}$  unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
<b>On / Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	65	-	-	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=60V, V_{GS}=0V, T_J=25^\circ\text{C}$	-	-	1	$\mu A$
		$V_{DS}=48V, V_{GS}=0V, T_J=85^\circ\text{C}$	-	-	10	$\mu A$
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=15A$	-	7.3	8.8	m $\Omega$
		$V_{GS}=4.5V, I_D=12A$	-	11.3	14.7	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=250\mu A$	1.2	1.6	2.5	V
Forward Transconductance	$g_{fs}$	$V_{DS}=10V, I_S=3A$	-	10	-	S
<b>Dynamic and Switching Characteristics</b>						
Total Gate Charge <sup>3,4</sup>	$Q_g$	$V_{DS}=30V, I_D=20A, V_{GS}=10V$	-	16.6	25	nC
Gate-Source Charge <sup>3,4</sup>	$Q_{gs}$		-	1.8	2.7	
Gate-Drain Charge <sup>3,4</sup>	$Q_{gd}$		-	6.5	10	
Turn-On Delay Time <sup>3,4</sup>	$t_{d(on)}$	$V_{DD}=30V, R_G=6\Omega, V_{GS}=10V, I_D=20A$	-	10	15	nS
Rise Time <sup>3,4</sup>	$t_r$		-	13.5	21	
Turn-Off Delay Time <sup>3,4</sup>	$t_{d(off)}$		-	28	42	
Fall Time <sup>3,4</sup>	$t_f$		-	20	30	
Input Capacitance	$C_{iss}$	$V_{DS}=30V, V_{GS}=0V, F=1\text{MHz}$	-	810	1210	pF
Output Capacitance	$C_{oss}$		-	320	480	
Reverse Transfer Capacitance	$C_{rss}$		-	22	35	
Gate Resistance	$R_g$	$V_{GS}=0V, V_{DS}=0V, F=1\text{MHz}$	-	0.9	-	$\Omega$
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	$I_S$	$V_G=V_D=0V, \text{Force Current}$	-	-	50	A
Pulsed Source Current	$I_{SM}$		-	-	100	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	-	-	1	V
Reverse Recovery Time <sup>3</sup>	$t_{rr}$	$V_R=30V, I_S=10A, di/dt=100A/\mu s, T_J=25^\circ\text{C}$	-	30	-	nS
Reverse Recovery Charge <sup>3</sup>	$Q_{rr}$		-	24	-	nC

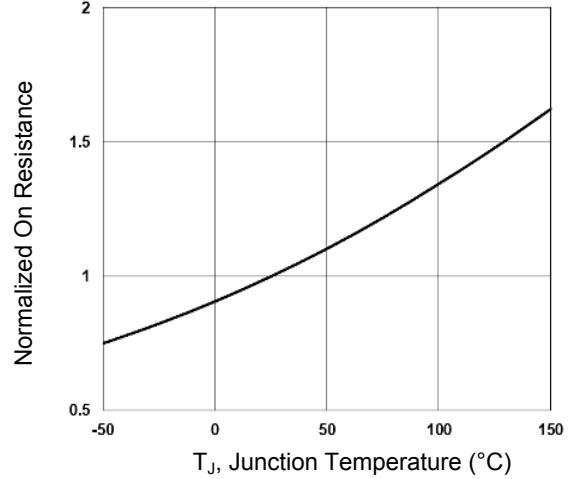
Note:

1. Repetitive rating: Pulsed width limited by maximum junction temperature.
2.  $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=37A, R_G=25\Omega, \text{starting } T_J=25^\circ\text{C}$ .
3. Pulse test: pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$ .
4. Essentially independent of operating temperature.

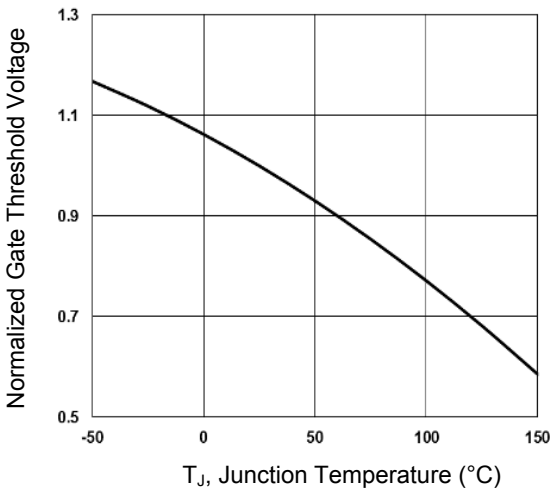
**Typical Electrical and Thermal Characteristic Curves**



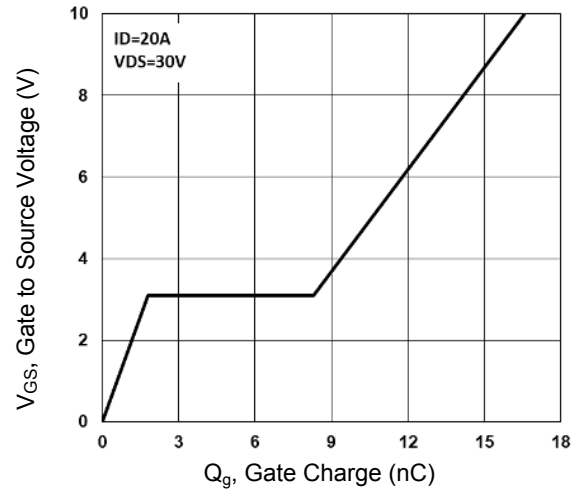
**Figure 1. Continuous Drain Current vs.  $T_C$**



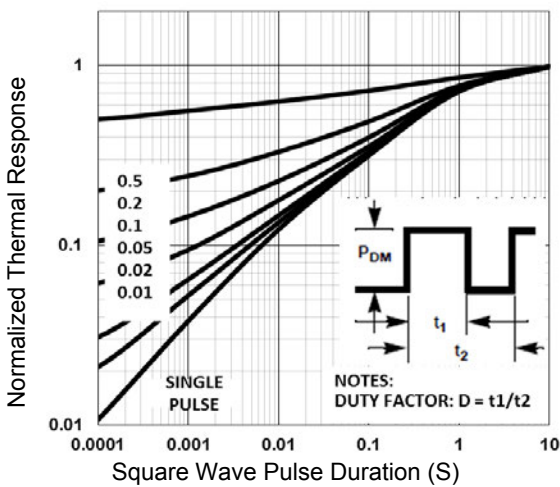
**Figure 2. Normalized  $R_{DS(ON)}$  vs.  $T_J$**



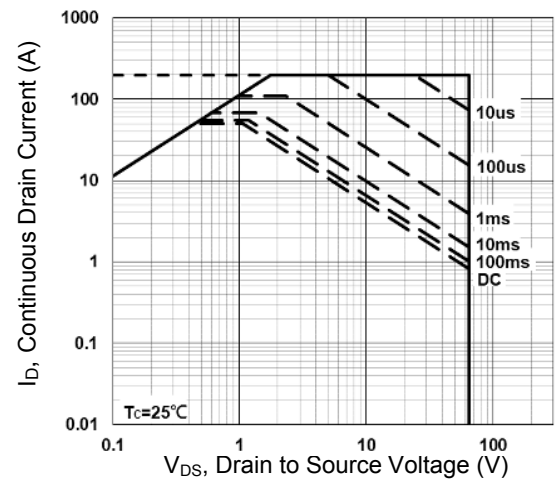
**Figure 3. Normalized  $V_{th}$  vs.  $T_J$**



**Figure 4. Gate Charge Waveform**

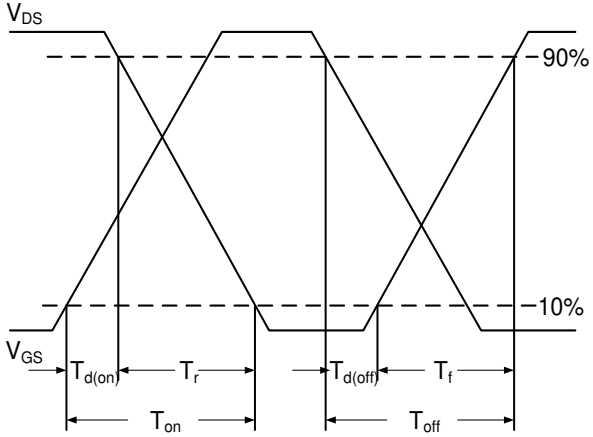


**Figure 5. Normalized Transient Impedance**

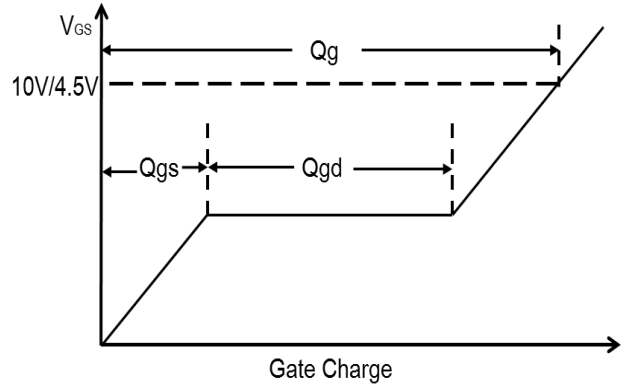


**Figure 6. Maximum Safe Operation Area**

**Typical Electrical and Thermal Characteristic Curves**

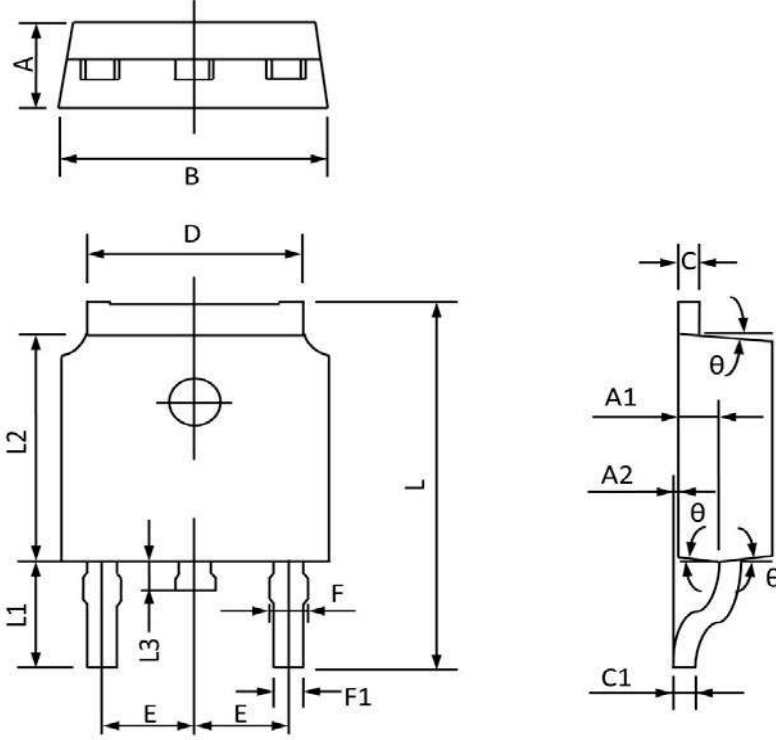


**Figure 7. Switching Time Waveform**



**Figure 8. Gate Charge Waveform**

**Package Outline Dimensions TO-252 (DPAK)**



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	2.200	2.400	0.087	0.094
A1	0.910	1.110	0.036	0.044
A2	0.000	0.150	0.000	0.006
B	6.400	6.800	0.252	0.268
C	0.450	0.580	0.018	0.023
C1	0.460	0.580	0.018	0.023
D	5.100	5.500	0.201	0.217
E	2.186	2.386	0.086	0.094
F	0.600	0.940	0.024	0.037
F1	0.500	0.860	0.020	0.034
L	9.400	10.400	0.370	0.409
L1	2.400	3.000	0.094	0.118
L2	5.400	6.200	0.213	0.244
L3	0.600	1.200	0.024	0.047
$\theta$	3°	9°	3°	9°